SEAMLESSLY COMBINED FREELY MOVING CURSOR AND JUMPING HIGHLIGHTS NAVIGATION

Field of the invention:

[001] The invention relates to a data processing system with a user interface, in particular with a graphical user interface (GUI) and a remote control device (RC) within a living room or a consumer electronics (CE) environment. The system enables the consumer to navigate among user-interactive items (such as commands or hyperlinks) and select a specific one with a highlight on a television display monitor (TV) as part of the GUI.

Background art:

[002] Interactive television (ITV) enables two-way communication using a television display monitor as a GUI. ITV typically relates to entertainment, information retrieval, and electronic shopping. An example of an ITV is a Web-TV interactive set top box (STB). In a living room environment with an interactive television (ITV) it is not easy for a user to navigate between user selectable options in a GUI menu. This is in part due to the vast amount of data and the large number of user selectable options that are offered to a user in the GUI menu. A computer mouse as input device is typically not useful for navigation in the living room environment.

[003] For example, in case of a Web-TV STB, the RC has four directional navigation keys for navigation (up, down, left, right), and an OK-button for selection. The option that is currently selectable is shown highlighted. The user can move the highlight to another selectable option by using the navigation keys. This can be a long and tedious process when many options are available scattered over the display screen, as they are likely to distract and irritate the user. Moreover, it takes substantial time and many navigation clicks for the user to get an option highlighted that is located at the other end of the screen when many options are displayed in-between.

[004] The problem is becoming more apparent with the introduction of more CE devices that enable user interaction with an increased number of selectable options. Since the user typically has a preference for a minimum number of navigation clicks (i.e., the lower the number of menu levels to go through, the better), this problem becomes even more apparent. Moreover the user

expects to be able to control the interactive environment at any time, e.g., when sitting in a relaxed position on a couch in front of the TV monitor.

Summary of the invention:

[005] The invention relates to a system for a user interface, in particular to a GUI within a living room environment, in which solutions are offered for dealing with an increased number of user-selectable options, while keeping it easy and fun for the user to control the options. The system provides in particular a solution for navigation to and the selection of a highlight, such as a command or hyperlink, as part of a GUI using a television screen (TV) as display.

[006] The emerging number of interactive applications is making navigation through user selectable options a challenge. In PC applications an important navigation tool to a desired option in an on-screen-display (OSD) is a mouse that controls an on-screen, freely moving cursor. When the cursor is moved to the option selected by the user, mainly using the mouse for coarse and fine positioning, the user can select the option by a mouse-click. The option closest to the current mouse position can be shown as highlighted. A trained user can navigate to a desired option in one arm swing and can make a selection shortly after.

[007] In a non-PC home environment a mouse is typically not the most convenient navigation tool. The invention describes a system that provides a solution for the home environment. It is therefore an object of the invention, among other things, to provide a solution that is intuitive and ergonomic to the user and is considered a natural extension to his/hers current user interface experience.

[008] A widely used and relative cheap tool is an RC. The inventors propose, for example, a highlighting that can be moved from one option to another as means to navigate to a desired option. Many RCs have four or more navigation keys that enable the user to jump from one option to a desired option. Typically an OK-button or select-button is available to select and activate the highlight.

[009] The inventors propose to add a coarse positioning user input device. An input device that is expected to perform well for the user is, e.g., a joystick such as a Force Sensitive Resistor (FSR) stick or FSR button. FSRs are well known elements, typically employed as strain gauges. By grouping the navigation keys around the FSR component an ergonomic navigation solution is created.

[010] It is another object of the invention to provide a relatively inexpensive solution. This can be achieved, e.g., by combining the navigation keys within the FSR device. For example, a combination implementation is achieved by discriminating between contact time intervals. Contact time discrimination can be achieved within the RC but can also be implemented external to the RC, e.g., in a consumer STB. A short FSR contact period can be interpreted by the system as a fine positioning command and a longer or continuous contact period as a coarse positioning command.

[011] The user can now quickly navigate to the desired option by using the FSR that can be operated by, e.g., his/her thumb. If needed, the navigation keys can be used for local fine navigation. The OK- or select-button can be used to select the option. The FSR can be constructed in such a way that, when depressed, it also acts as the select button.

[012] Instead of an FSR, other coarse positioning input devices can be used. Examples are a touch-pad, a tracker ball and gravity/gyro based devices. The FSR can come in various sizes and shapes. An example of an ergonomic input device is one that can be hold with one hand whereby the navigation to the desired option and its selection can be done with one's thumb. Therefore the inventors have designed an RC with navigation keys and a FSR that can be depressed to double as OK-key for option selection. The form factor is such that the RC is easily controllable within the range of one's thumb when holding the RC.

[013] Position indication for coarse navigation can be visualized by using, e.g., a moving highlight or by a freely moving cursor or a combination of thereof. Further information about a method to calculate which options should be highlighted when using the moving highlight is found in, e.g., patent application US S/N 09/426,518 (Attorney docket PHA 23,785) filed 10/26/99 for Maurice Cuijpers and Jan van Ee for DIRECTIONAL NAVIGATION WITHIN A GRAPHICAL USER INTERFACE.), incorporated by reference in its entirety herein.

[014] In a preferred embodiment a freely moving cursor for coarse navigation and a jumping highlight for fine navigation to visualize the navigation position is described. Upon stopping using the coarse control input device an option closest to the cursor position will be highlighted and the cursor disappears. The cursor preferably fades out gradually a predetermined time after the user has stopped using the coarse control input. When the user wants to use the coarse device again at a later stage the GUI designer can, e.g., let the cursor re-appear at the position of the highlighted option of that moment. By doing so the inventor created a manner to seamlessly

combine a freely moving cursor and a jumping highlight that are both used for the navigation method. It should be noted that even though a freely moving cursor is used for coarse navigation, a jumping highlight can be visible simultaneously. In another embodiment only a jumping highlight is used to visualize the navigation position for both coarse and fine navigation.

[015] It is yet another object of the invention to provide a GUI designer more design freedom, Re-use of a GUI that was originally designed and formatted for a PC environment, which is sometimes the case of Web-TV content, is now possible.

[016] It is noted that the RC described can also be used for a non-visual coarse and fine navigation method. For instance the navigation feedback can be realized by using an audible signal. For example, the coarse navigation position feedback can be achieved by producing a sound of a certain frequency and the fine position feedback by voicing the name of a current highlight.

[017] The inventors propose that current interactive CE-devices, such as, but not limited to, a Web-TV STB, can be upgraded to the teachings of the invention. In practice this can be achieved by providing the user with an RC according to the invention and by installing or having installed a software (SW) upgrade at the CE-device that embeds the GUI and the GUI-behavior in accordance with the invention. The inventors also propose that instead of downloading improved SW to the CE-device, a remote service can be responsible for generating the GUI and the GUI-behavior in accordance with the invention. In other words, the SW application is run at a server external to the home equipment.

Brief description of the drawing:

[018] The invention is explained in further detail below, by way of example, and with reference to the accompanying drawing wherein:

[019] Fig. 1 is a diagram of an RC, which can be used as a user input device according to this invention.

[020] Fig. 2 is a diagram illustrating a GUI screenshot that shows a beginning of a user navigation action.

[021] Fig. 3 is a diagram illustrating a GUI screenshot that shows one of the final steps of a user navigation action.

Detailed descriptions of the embodiments:

[022] Fig. 1 is a diagram illustrating an RC 100, which can be used as a user input device according to this invention. RC 100 comprises an 8-way navigation key pad 104 for fine navigation, an FSR 106 for coarse navigation, and an OK-button 108 for selection of a desired option. RC 100 also comprises a back key 110 and a function key 112. An inexpensive RC version only uses a 4-way navigation key pad 104 (with left, right, up and down keys). FSR 106 comprises a navigation button. The firmer the user pushes the button in a certain direction in the plane of the button, the quicker the coarse navigation occurs. In a preferred embodiment the OK button 108 is functionally a part of the FSR navigation button 106. Upon depressing button 106 the user activates the OK button 108. This is achieved, for example, by mounting FSR button 106 on a clickable element that can be moved perpendicularly to the plane of button 106 and that has two stable positions. One position is assumed when there is no vertical force applied to the element, the other one is assumed when a vertical force is applied of a magnitude above a certain threshold. In this manner the user experiences a tactile feedback when actually selecting an option through the OK button 108. Of course, other implementations are possible. Preferably, the coarse positioning means 106 is positioned between the OK button 108 and the keypad 104 for fine navigation. In order for the user to operate the keys of keypad 108 for fine navigation in an ergonomic and convenient manner, these keys are to be positioned at a certain minimum distance from each other. They are not to be positioned at a too large distance from each other either, so as to enable the user to operate them with his/her thumb. Accuracy is not so much of an issue with respect to the coarse navigation. Accordingly, it is preferred that in the lay-out of the buttons and keys, the coarse navigation user input means 106 lies within an area enclosed by the keys of keypad 104 for fine navigation. Back key 110 can be used to quickly get back to the previous navigation position. Functions key 112 can, e.g., navigate the user to a different set of options or to a higher-level functions menu. Key pad 104, FSR 106 and OK button 108 can be molded integrally as one part, making its usage more intuitive and ergonomically acceptable to the user.

[023] As noted earlier the RC can be made less expensive by using contact time discrimination detection. That is, contact time is measured to discriminate between coarse and fine navigation. For example, if the user uninterruptedly presses a navigation input for a longer time period, the

system interprets this as the coarse positioning mode, and sweeps the highlight fast across the screen. If the user taps the navigation input slightly, the system interprets this as a fine positioning mode and lets the highlight jump accordingly only one step. By, e.g., shortly tapping one's finger on the top ("north") part of FSR 106 the user achieves an upwards moving highlight. In that case key-pad 104 may not use individual physical keys, but is rather implemented as an integral part of FSR 106. This not only makes the RC less costly, it also makes the RC smaller.

[024] Fig. 2 is a diagram illustrating a GUI screenshot 200 that shows a beginning of a user navigation action. Screenshot 200 comprises a highlighted option 202, a desired option 204 and some other hotspots and options, e.g., options 210. With a hotspot in this context is meant an Internet hyperlink, a control command, etc. As can be seen from screenshot 200, it will take the user quite a number of key-pad 104 presses to get from option 202 to desired option 204. Moreover, this can be achieved in numerous combinations of key-pad 104 key-presses. Using only key-presses, the user actually has to decide on a strategy of how to get to the desired option in the quickest and/or easiest way. The user may well consider this as an annoying and unpleasant action. If the user chooses to do so, he or she can still navigate by only using key-pad 104 key-presses and OK-button 108 for activation or execution of the desired option 204.

[025] Fig. 3 is a diagram illustrating another view of GUI screenshot 200 that shows some progress in the user navigation action. Screenshot 200 comprises the, previously highlighted, option 302, a newly highlighted option 306, a freely moving cursor 308, the desired option 204 and other hotspots and options 310. Cursor 308, which appears on the screen after the user uses the FSR 106, has traveled in a continuous path from option 302 to option 306, corresponding to the direction of a force the user has been applying to the FSR 106. In the preferred embodiment the cursor 308 disappears from the screen once the user stops applying a force to the FSR 106. A hotspot or option closest to the position of the cursor at that moment will be highlighted, in this case option 306. The close proximity of desired option 204 from highlighted option 306 should be noted. It will take the user little effort to navigate from option 306 to desired option 204 by using key-pad 104. The user only needs to depress the left-down key of key-pad 104 in order to let the highlight jump from option 306 to desired option 204. By subsequently pressing OK-button 108 the user activates or executes the desired option 204.